

Interaction between linguistic levels in language handicapped children

David Crystal

University College of North Wales

It is a truism that there should always be a close interaction between the empirical, methodological, and theoretical dimensions of language study, and it is therefore remarkable to find how often one or other of these dimensions comes to be neglected. At present there is no shortage of theoretical ideas about the nature of language handicap in children and the task of intervention. Nor is there a lack of methodological discussion, whether we are talking about research design or therapeutic procedures. But there is an extraordinary absence of empirical facts. Even within the limits of available theoretical frameworks, no comprehensive description of any handicapped child's language problem has yet been published. There have of course been many experimental and naturalistic studies of selected aspects of the problem, working at different linguistic levels - an aspect of grammar, or phonology, for example. But these studies obscure a fundamental point, which is that a central characteristic of language handicap relates to the interaction taking place between the various levels of linguistic structure - an interaction which in turn needs to be seen in the light of the demands made upon language in the context of use. Without an adequate description of all relevant levels and contexts, therefore, the real explanation of a child's language handicap can easily be missed.

This point becomes clear if we look briefly at the range of levels and contexts regularly identified in the contemporary literature, and ask how far the clinical or remedial field routinely provides systematic information under each of these headings. I will restrict my remarks to spoken language, secure in the knowledge that whatever gaps there are under this heading, the situation is far worse when we come to consider handicaps of written language or of signing.

Segmental phonology. The description of a child's ability to use vowels and consonants, and to combine these into syllables, is probably the most well-recognized domain of study, and vowel or consonant inventories, based on samples or tests, are regularly given. Nonetheless, there are few published accounts of the whole syllable inventory of a child; processes which affect sequences of segments (such as consonant harmony) are often identified in an ad hoc or anecdotal manner; if the language has consonant clusters (English, for example, has over 300), these are usually treated in a very selective way, and one fails to obtain a clear impression of an emerging system; consonants may be described globally, instead of with reference to their distributional differences within words and phrases; and vowels may simply be ignored (still regrettably commonplace in articulation tests). There is ^{also} ~~still~~ a reluctance to use transcriptional conventions which are geared to the needs of the handicap situation, even though at least one new system of symbols devised especially for disordered speech has been around for 10 years (referred to in Ingram 1976: 93) ~~1973~~ and another for nearly five (Grunwell et al 1980).

Non-segmental (suprasegmental) phonology. Here the neglect reaches into basic training. Very few speech pathologists or therapists, and no teachers, in my experience, qualify with an adequate ability to discriminate, transcribe, and work with the many contrasts of non-segmental phonology - the patterns of pitch, loudness, tempo, rhythm, pause, and tone of voice. In the research literature, it is commonplace to see examples of child speech printed with ordinary punctuation, or with ad hoc symbols (such as an array of dots to indicate pauses), which can provide only the palest of reflections of the way the speech sounded. With some children, this does not much matter, because the focus of difficulty is in relation to aspects of language which can be studied relatively independently of non-segmental effects (vocabulary learning, for example). But

with the deaf (where problems of pitch and stress are familiar, and where the need for rhythm training is essential) and with the mentally handicapped (where the earliest contrastive vocalizations may use non-segmental sound effects of an unexpected kind), the adequacy of a non-segmental account is criterial. It is often said that the test of a good phonetic transcription is that, having made it, you can throw away the tape and rely totally on the symbols. If that is so, then it is rare indeed to find such transcriptions in the field of language handicap. One cannot avoid the conclusion that a fundamental dimension of language description is regularly being overlooked. The clinical significance of this omission will be discussed below, (and see further, Crystal 1981: Ch. 3). Grammar. The focus on grammatical (especially syntactic) study in recent years has led to a marked improvement in the depth of detail of description at this level. The highly selective and oversimplified tests of grammatical ability, based largely on a few word endings, are now much less used, and several descriptions of syntax, based on various grammatical models, are routinely in use. This is the strong point in contemporary clinical description, and as such needs no comment for the moment.

Semantics. This, the most important of all the linguistic levels to the practising clinician (who is primarily concerned with the development of a child's ability to control meaning), is also the most neglected. There has of course long been a focus on vocabulary, but this domain is traditionally approached in a simple, quantitative manner (little more than basic word counting) with some elementary grouping into fields (words for fruit, vehicles, etc.). Very few attempts have been made to describe the network of semantic relations which link lexical items, and which are the main task in semantic learning. The absence of an adequate semantic theory is often cited, at this

point, but this is a red herring: at the elementary level of description which we require to make sense of the basic vocabulary patterns of the young child, we have more than enough semantic theory at our disposal. If we did little more than systematically apply such notions as semantic fields, semantic features, or sense relations (antonymy, hyponymy, etc.), there would be a major advance in the sophistication of our semantic descriptions.

The same point applies to the other major area of semantic enquiry - the analysis of sentences into their underlying 'cases' or 'functional' relations (actor, locative, etc.). Here too the inadequacy of available theoretical accounts should not blind us to the relevance of the underlying insight, which can be readily applied to the analysis of the simple sentences used in early development, where the awkward cases that bedevil adult semanticists do not arise. To take just one example, a functional element analysis of a language handicapped 5-year-old recently brought to light the fact that the child was not using temporal expressions (e.g. now, next week, in the morning). No-one had noticed the point previously - simply because people had been concentrating on ~~the errors in the child's speech production, and had failed to notice what the child had been doing wrong, and not on~~ what he had not been doing at all. It is always more difficult to see what a child is not doing. And even when a problem area is pointed out, it is often impossible to reach a confident judgement. After the therapy session just referred to, for example, none of the observers were able to say whether or not the child had used a temporal expression during that half-hour. The finding emerged only from a systematic description of the sentence patterns in functional terms. Yet this dimension is routinely ignored in clinical description.

Pragmatics. This currently fashionable dimension of study is in principle of great relevance to any enquiry into handicap; but in practice it is at present the area where least clinical progress can be made - notwithstanding the innumerable pragmatic intervention procedures which are now being imposed upon unwary patients, most of which are so superficial that they add up to little more than an injunction to clinicians to pay careful attention to what is going on in their clinic. 'I've been doing pragmatics all these years and never knew it', said a speech therapist to me recently. Doubtless as basic research gets done, and descriptions become more detailed, and developmental norms become clearer, the initial scepticism which has emerged in the wake of pragmatic proposals will disappear. But there is a lot of work to be done. The area is so vast that it is difficult to see how order can be imposed upon it. At one extreme, it deals with such matters as the contextual factors influencing the choice of, say, tu vs vous; at the other, it deals with such questions as why it is not proper to tell a joke during a funeral. In other words, it encompasses all the factors which govern the clinician's intervention procedures (including room layout, choice of materials, and so on) as well as the background and expectations of the child. It is an area which can best be approached from the 'bottom up', by selecting different factors and trying to control for their influence. At least this way one can be precise, even in the absence of a general perspective.

Linguistic interaction. Of all the contextual factors which one must take into account in order to arrive at a complete description of a language handicap, the strategies of interaction used by clinician and child are the most important. And what this requires, in the first instance, is a description of the kind of language used by the clinician to the child. It is often forgotten that a

language handicap cannot be defined in isolation from the linguistic environment. It is not possible to look at a child and say - 'Ah, you can tell there is a language handicap'. The only way in which the existence of a language handicap emerges is to talk to the child, and see whether there is comprehension and production. And this, in turn, means that a great deal of weight is placed on the kind of language we select to use when we initiate this interaction. If we speak in too advanced a manner, the child will be unable to respond. If we are too simple, the child may be reluctant to respond. Getting the level right poses the clinician with the greatest of problems. And this general point, ~~as we shall see~~, applies right down to points of linguistic detail - such as choosing individual grammatical constructions, sounds, or words. It is not difficult to establish a 'diagnosis' of a pronoun-deficient child, if all we do in our tests and teaching is elicit pronouns from him.

Longitudinal study. Everything which has been said so far applies to the description of a sample of language at a particular point in time - for example, a recording made during a clinic session, or at home. I have been arguing that our descriptive records of these samples are insufficient - far below what would be required at a corresponding descriptive level in medical science. But the synchronic study of individual samples is not enough. Part of the definition of the handicap is the way the language changes (or fails to change) over time - a longitudinal dimension. This is not an optional extra, something which an researcher might care to do, if there's time, to see if there has been any change, or ^{which} a clinician might do, to see if therapy has worked. It is an essential part of the definition of the handicap to say how rapidly the condition alters over time if left untreated or in response to treatment. This is how the concept of disease is handled in medicine, and it is necessary to

develop precisely the same concept in working with language handicap. Otherwise it is not possible to address the question of the relationship between, say, mentally handicapped children and language delayed children. Whether they acquire language using the same developmental stages is an important question, but no differential diagnosis of their language problems can be made without taking into account the time-scale or 'learning curve' associated with the acquisition of different linguistic features. This diachronic dimension is a necessary supplement to the detail provided by a synchronic description of a single sample, (Crystal, 1984).

The problem of integration

The primary motivation for the need to make a detailed analysis of linguistic levels arises out of our awareness that the kind of activity which goes on at each level is highly complex. And the more we study this complexity, the more complexity we find. The risk, of course, is that by focusing too sharply on the detail within any one level, we may fail to notice principles or factors which arise solely out of the relationships between levels. In the therapeutic context, we are constantly being reminded of the need to keep the 'whole patient' in mind as we attempt to remediate a particular deficiency (though it is not always clear exactly what kind of precise interpretation to give to such an exhortation). What is sometimes forgotten is that the same holistic perspective needs to be borne in mind by those doing research into language handicap. Let us look at the implications of this principle.

When we identify a primary problem as belonging to one linguistic level, this is not the end of the diagnosis - it is only the beginning. We must immediately ask what the consequences are for the child in terms of the other levels of linguistic ability. Thus, for example, if the problem is identified primarily at the phonological level, we must not forget to consider what the

consequences of the aberrant phonology are for the other levels of linguistic structure. Are particular aspects of the grammar going to be affected (e.g. the implications for word-endings in English of a deficient /s/)? Are certain types of vocabulary going to be missed? Will the poor articulation cause non-segmental difficulties, such as a poor stress pattern or rhythm? And what are the pragmatic implications? Will people talk to the child in the same way, and will the child devise strategies to handle people who do not understand? Similar kinds of interaction emerge whichever linguistic level is primarily implicated.

The problem is how to act, to take account of this general principle. It is easy to say that there is 'interaction', but how are we to identify the detail of this interaction, and how can we devise therapeutic procedures to take account of it? The first step is to gather together the evidence of interaction whenever it occurs, and this has been the purpose of a recent Medical Research Council project which was carried out at the University of Reading in 1984 and 1985. The details of the project are currently being written up, but certain interesting findings have already emerged, all of which support the need to develop a model of clinical linguistic analysis in which the interaction between levels is the primary feature.

By way of background, the following details should be noted. There were 30 children in the study, all of whom attended a special assessment clinic which I ran at the University for several years. The children, aged between 3;3 and 10;7, had all been referred by speech therapists, educational psychologists, or pediatricians for a detailed linguistic investigation. All were said to have language problems, and none had a clear medical or psychological diagnosis. There was occasionally some relevant medical history (e.g. fluctuating hearing

loss, or soft neurological signs), but nothing which could account for the language deficit. Intelligence was usually within or above normal limits, with just a few of the children slightly below. Several children had problems of memory or attention (see below). In many of the cases, the seriousness of the language problem had not been realized until quite late - usually after the child arrived at school - and seemed not to be getting better. In most cases, only a small amount of speech therapy was available; but even in cases where there was a great deal of support, the language problem had developed to such a complex level that it was difficult to know how best to continue with therapy. Each recording consisted of a normal clinical session (20-40 minutes) in which the children interacted with the speech therapist in a free play situation with toys or books, and chatted (insofar as they were able) about general affairs (school, TV programmes, etc.). For the MRC project, two 50-turn samples were taken from within this session.

These samples were described from a linguistic point of view, using the phonological, grammatical, and semantic profiling procedures described in Crystal (1982, and elsewhere), and with the addition of a summary of fluency problems. Each profile represents the main linguistic features which operate at a given linguistic level. An analysis was made of the main patterns within each profile, and several points were identified where there seemed to be some kind of interaction between the profiles. Some of these points were then followed up in a structured session, in which the children were tested in a more formal way, and it is here that the problem of interaction emerged in a particularly clear form.

As an illustration, let us consider an example from an early stage of development. John was nearly 5 and was seriously language delayed, this being

noticeable mainly in his grammar, where he fluctuated between a 2- and a 3-element stage, with a phrase level bias, and few word endings (LARSP Stages II and III: Crystal 1982). He had developed quite a good vocabulary, but he had a few word-finding problems, and a marked deictic bias (a reliance on such 'empty' items as there, that, etc.). His segmental phonology was immature, but making progress: there were still several consonant and vowel harmonies, some final consonant deletion, and cluster simplification - though he was beginning to produce a few consonant clusters at the ends of words. His non-segmental phonology was good most of the time, but there were apparently inexplicable 'bursts' of non-fluency and incoherence, characterized by a wild rhythm, incomplete intonation units, and the occasional stammer. He was intelligent, with a charming extrovert personality. His attention wandered a little, and he was said to be somewhat clumsy. He was receiving speech therapy for a half-hour each week, and the therapist was currently working on building up clause structure, after having spent some time on consonant articulation. He was not making much progress, and she was puzzled by some erratic fluctuations in his ability. At one point, articulation of a word would be quite good, yet at another, it would deteriorate. Fluency, likewise, was erratic.

The analysis suggested that here was a child who was coping quite well at a certain linguistic level, but when he attempted (or was made) to go beyond that level, he was unable to handle the greater complexity involved. When I first saw him, Stage II sentences (such as The man is running) were being produced confidently, with good articulation and rhythm. However, when he tried to add an extra clause element, to produce a Stage III sentence (such as The man is kicking the ball), several things happened. Often, the confident rhythm would be lost: pauses would be introduced both within and between phrases, and there

would be uncertain elongations of sounds. Sometimes, the rhythm would be fairly stable, but the segmental phonology would deteriorate (e.g. one consonant would assimilate to another: cf. the dog /dog/ is running vs. the dog /gog/ is chasing a cat). Several such changes might take place at once, so that the sentence as a whole became much more difficult to understand. 'The longer the sentences, the worse the intelligibility', one might say for such a child - something which was later supported by the results of a sentence repetition task, in which phonological ability plainly deteriorated as the sentences increased in length.

What was even more interesting was the way in which this child's attempts at more complex grammar affected his semantic skills - at least, as far as vocabulary was concerned. This can be illustrated from the following dialogue taken from the structured session, where the therapist was trying to make him 'say the whole sentence':

T: 'what's 'happening hère/

P: 'eating a càke/

T: that's ríght/

the 'man's 'eating a càke/ 'isn't he/

can you 'tell me áll of it/

P: 'man `eating/

T: yès/

`eating -

P: a càke/

T: 'all togéther/ the -

P: 'man `eat it

T: 'eating a càke/

P: 'eating a càke/

T: 'that's ríght/

whát's 'happening/

'tell me agáin/

P: 'hím èat it/

T: whò is/

P: mán/

The dialogue does not end here, but the point is plain enough. While P is producing a 2-element clause, he is able to use specific lexical items - either man + eat or eat + cake. But when he is made to go for a 3-element clause, he replaces one or both nouns by deictic forms. It is as if there is a trading relationship between his grammar and his semantics: 'short grammar + specific lexis' is one possibility; 'longer grammar + empty lexis' is another. What we do not get is 'long grammar + specific lexis throughout' - at least, not at this stage.

With another child, the same kind of problem showed itself at a much more advanced level of grammatical development (Stage V on LARSP), when there was an attempt to produce complex sentences (i.e. consisting of more than one clause). This child had no trouble saying 3- or 4-element clauses, with substantial phrase structure and word endings, and good pronunciation, e.g. We saw my grandma in the shop today. But as soon as she attempted to connect clauses, there was deterioration. In this particular case, there was a marked non-fluency when complex sentences were attempted, including an emergent stammer (the kind of effect which is often arbitrarily labelled 'normal non-fluency' at around age 3), and an unintelligible running together of unstressed syllables. There was also some deictic substitution, and even some grammatical breakdown, especially in later clauses:

P: he did pu - push him in the water/ and - and - he wet/ and (1 syllable)
again it/

(Apparently, the copula had been a major problem for this child a year or so before. Its omission again here illustrates a pattern of regression which I find to be quite common when children first try to produce complex sentences.)

Many of the children in the sample showed similar patterns of behaviour in which an increase in complexity in one level of linguistic structure promoted difficulties in some (or occasionally all) of the others. In a desperate search for an analogy, I am reminded of the old song 'There's a hole in the bucket' - in this case, a bucket which has a series of holes around its middle. As long as the water stays below the level of the holes, there is no problem. But once it is filled to above that level, water will start to flow out from all points within the bucket. Applying the analogy, the holes represent the limits of a child's linguistic ability at a given stage of development, defined in terms of a combination of features from all levels of linguistic structure. As long as the child stays within those limits, there is no problem. But if the child pushes his language (or has it pushed) to a higher level, there is some degree of disruption. The point is that the addition of any linguistic feature can be enough to raise the level to the overflow mark.

It has been said that all analogies leak (an appropriate metaphor, in the present instance!), so it would be wise at this point to switch to more familiar metalanguage, and talk instead of a limited processing span. But the term 'span' is not particularly appropriate either, with its implications of linearity. We are plainly here dealing with something which is partly linear, partly hierarchical, and which involves a many-to-many network of relationships between different components. Moreover, the units which are recognized within this network, while identified as linguistic in the first instance, need to be

related to other kinds of ability - notably, memory and attention. Two out of three of the children in my study had a history in which people had discovered limitations in one or other of these abilities. Auditory short-term memory was most commonly cited. The problem does not reduce to an explanation in terms of memory and attention, however - after all, one out of three children had no history of problems in these areas. But it is evident that the answer to the question of what causes such problems of linguistic interaction requires more than a narrowly linguistic explanation.

Personally I think the most promising line of enquiry is to look more closely at the notion of fluency, and in particular at the underlying idea of the intonation-cum-rhythm units which are the basis of normal speech. All children in the sample were said to be poor at copying (non-linguistic) rhythms, and all displayed some degree of rhythmical disruption in their attempts at more advanced sentences. Rhythmical chunking is well-known to be an important factor in improving recall facility, in memory experiments, and it has been shown to be the earliest feature to emerge in language acquisition. Rhythmical difficulties have been highlighted in a wide range of handicaps, such as reading disability, mental handicap, and deafness (in the latter case, for example, complete methods of intervention have been based on the teaching of rhythm, as in Van Uden (1970)). It therefore seems to me very likely that an adequate rhythmical ability is required in order for a child to 'hold together' the relevant bits of linguistic information, and ^{that} only once a confident rhythm is achieved would it be wise to elicit more advanced language patterns. Therapy often proceeds too quickly, in this respect, with new patterns being introduced before the old ones have been thoroughly assimilated (as measured by fluency criteria). Unfortunately, I have no idea what norms of rhythmical development are like, and therefore cannot be more precise about what meaning to give to such terms as 'adequate' and 'too quickly'. The provision of normative data on the emergence of rhythmical skills is thus, I would suggest, an urgent research task, if we are to arrive at a unifying explanation for the nature of language handicap.

References

- Crystal, D. 1981. Clinical linguistics. Vienna: Springer.
- 1982. Profiling linguistic disability. London: Edward Arnold.
- 1984. Linguistic encounters with language handicap. Oxford:
Blackwell.
- Grunwell, P., et al 1980. Progress report: the phonetic representation of
disordered speech. B.J.Dis.Comm. 15, 215-220.
- Ingram, D. 1976. Phonological disability in children. London: Edward Arnold.
- Van Uden, A. 1970. A world of language for deaf children. Part I: Basic
principles. Rotterdam: University Press.